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ABSTRACT

This study analyzed a public school prekindergarten Montessori bilingual program, investigating second grade reading achievement scores on Spanish and English norm-referenced tests and comparing students who had participated in the Montessori program with those who had participated in a prekindergarten traditional bilingual program. Participants were second graders enrolled in a large urban Texas school district who had been involved in one of the two programs. All students were of Hispanic origin and from low socioeconomic status families. Students completed the reading section of the Aprenda (Spanish) and Iowa Test of Basic Skills (ITBS; English), which the school district administered annually to measure student progress. The Aprenda Spanish test is a written test that examines word reading, reading comprehension, language, and listening. The ITBS measures reading achievement gains. Data on 100 students indicated that children who had participated in the prekindergarten Montessori bilingual program significantly outscored the other children on the Spanish reading subtest of the Aprenda achievement test. Children who had participated in the prekindergarten Montessori program and who had continued through second grade in a transitional bilingual program significantly outscored those in the other group. The results suggest that school districts should look closely at program placement for limited English proficient students (Contains 36 references.) (SM)

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An Analysis of a Public School Prekindergarten Bilingual Montessori Program

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An Analysis of a Public School Prekindergarten Bilingual Montessori Program

The purpose of our study was to analyze a public school prekindergarten Montessori bilingual program via the investigation of second grade reading achievement scores on a Spanish and an English norm-referenced test between two groups of students those who had participated in a prekindergarten Montessori bilingual program and those who had participated in a prekindergarten traditional bilingual program.

Statement of the Problem

Our study addressed the long-term academic impact of a public school prekindergarten Montessori bilingual program on second grade students' academic achievement as compared to a prekindergarten traditional bilingual program. According to Rosanova (2000), Montessori bilingual education was virtually unexplored by the American Montessori educational community.

Significance of the Study

Transitional bilingual education programs traditionally have served more than 33% of all limited English proficient children by providing them instruction in their native language, along with education in English as a second language (Supik, 1997). The program that was the focus of this study was a transitional Montessori bilingual model. To date, the literature does not provide sufficient data related to the implementation or impact of transitional Montessori bilingual education in a prekindergarten public school.

Although the pedagogy introduced by Maria Montessori is over a century old, it is remarkably relevant for low socio-economic preschool children of the 21st Century. According to Kramer (1988), Montessori was deeply concerned with social injustices for women and children; therefore, she concentrated her efforts on those women and children

from poor socio-economic status and initially on those children with apparent mental deficiencies (Standing, 1984).

Today's society has promoted Montessori primarily for an exclusive private education even though Montessori focused her initial work toward poor children. For example, according to Ruenzel (1997), only four percent (200) of the approximately 5000 schools in the United States are funded under public education. Thus, the social injustice for which Montessori worked continues to be evidenced in the schools of her namesake in which general access to her methodology or philosophy is limited to those who have the resources to afford private school education.

Materials for teaching in Montessori programs are currently developed primarily in English, and they are not specific to the Hispanic culture (Galindo & Rodriguez, 2000); thus, the access to Montessori for children who are in the low socio-economic status (SES), limited English proficient (LEP), and Hispanic is further limited. Indeed, even in the literature there is a paucity of references to Montessori and SES and/or to Montessori and Hispanic LEP children and corresponding bilingual educational programs. In an exhaustive review of literature, only two studies were found which related to low SES (Jackson, 1980 & Wheeler, 1998), while only three studies found related to ELL children (Irby & Rodriguez, 2000; Jackson, 1980; Wheeler, 1998). This study's results has provided data important for administrators and teachers as they attempt to reform prekindergarten bilingual programs.

The Montessori Method

The Montessori method of education was developed in Italy by Dr. Maria Montessori in 1906 to serve disadvantaged children (Kahn, 1995). Her first school, Casa

dei Bambini, served 50 very poor children from a Roman slum (Ruenzel, 1997). Montessori stated:

> The poor have not yet had proper consideration, and always there remains one class that was yet more completely ignored, even among the rich. Such was childhood! All social problems are considered from the point of view of the adult and his needs… Far more important are the needs of the child. (Montessori, 1961, p.120)

She continued in the same essay, "suppose we set up in schools the same social improvement that we are so proud of achieving! Let us feed the children, give them playground, clothing, freedom of speech" (Montessori, 1961, p.121).

According to the National Center for Educational Statistics, only 50% of children living in households with incomes of $10,000 or less receive care and education from persons other than their parents, in comparison to 77% of children in households with incomes in excess of $75,000 (NCES, 1999). Kagan (1989) indicated, "there are vast inequities regarding children's eligibility an access to programs. Children are segregated by income, with limited choices and resources for low-income families" (Kagan, 1989, p. 234), and, this situation "…does not reflect the law or spirit or our nation" (Kagan, 1989, p. 235).

Indeed, even the literature was limited in its references to Montessori and low socio-economic status (SES), much less to Montessori and limited English proficient (LEP) Hispanic students and corresponding bilingual educational programs. In an exhaustive review of Montessori literature, only two studies were found which related to low SES (Jackson, 1980; Wheeler, 1998), while only three studies were found related to

LEP students (Jackson, 1980; Irby & Rodriguez, 2000; Wheeler, 1998). Our study included a program that applied the Montessori method to both low SES and LEP.

Research Question

The following research question was addressed:

> Is there a significant difference in second grade reading achievement scores in English and Spanish between two groups of students based on their participation in either a prekindergarten Montessori bilingual program or a prekindergarten traditional bilingual program?

The population included in this study was 450 second grade students enrolled in a large urban school district in southeast Texas in 2000-2001 who had participated in either (a) a prekindergarten Montessori bilingual program in 1998-1999 or (b) a prekindergarten traditional bilingual program in 1998-1999. Students who had been enrolled in the prekindergarten Montessori bilingual program were considered the experimental group, while students who had been enrolled in the prekindergarten traditional bilingual program were considered the control group. All subjects were of Hispanic origin and from low socio-economic status.

To answer the research question related to Spanish reading achievement, a random sample was selected from the population of 450 students who had taken the Aprenda achievement test for second grades and who were enrolled during the 2000-2001 school year (100 second graders who had previously participated in either (a) a prekindergarten Montessori bilingual program in 1998-1999 or (b) a prekindergarten traditional bilingual program in 1998-1999). According to Gall, Borg, and Gall (1996), if the difference between the two groups of students being compared is anticipated to be

large one, the more rigorous statistical power level of .7 at .05 level of significance suggests 40 participants would be needed for the research sample, or if it is anticipated to be medium and at the same power level, 100 participants would be needed.

To answer the research question related to English reading achievement, a random sample was selected from the population of 100 students who had taken the ITBS achievement test in the second grade and who were enrolled during the 2000-2001 school year (100 second graders who had previously participated in either (a) a prekindergarten Montessori bilingual program in 1998-1999 or (b) a prekindergarten traditional bilingual program in 1998-1999)

Context of Study

Prekindergarten Montessori Bilingual Program

Like most public school prekindergarten educational programs, which are funded with federal funds that support low-income children, the prekindergarten Montessori center had 89% of the children identified at poverty level. Of the 690 children on the campus, 80% are Hispanic, 14% African-American, and 6% other. Sixty-two percent of the children are categorized as limited English proficient (LEP) and are served in bilingual classrooms (Texas Education Agency, 2001). The prekindergarten Montessori center, opened in the fall of 1998, was a result of school district's successful passage of a 20 million dollar bond election to support the building of four early childhood centers. The prekindergarten Montessori center was a 40,000 square foot urban campus that houses 18 classrooms, a multi-purpose room, library, teacher workroom, lounge, nurse's station, parent workroom, diagnostician office, counseling room, speech therapy room, and an office area. Each classroom was equipped with its own lavatory, drinking

fountain, and sink. Twelve classrooms are in open areas, while six are self-contained. Nine of the classrooms are designated as bilingual classrooms (five are self-contained; four are open). A grass-covered playground surrounds the campus. On one side of the campus was a wooded area, on another side was a large church, and on the other side was large Hispanic flea market. The campus sits on the corner of a busy Houston intersection. The five elementary campuses participating in this study were located within a five-mile radius of the prekindergarten school. Those campuses house a transitional bilingual program and/or an English as a second language program.

Prekindergarten Traditional Bilingual Schools

There are three prekindergarten traditional schools, which are located in the eastern and western quadrant of the school district. The three Prekindergarten educational programs are funded with federal funds that support low-income children. The three campuses are: (a) prekindergarten traditional school A had 87% of their student population economically disadvantaged. Thirty-five percent of the children are categorized as limited English proficient (LEP) but only 40% are served in bilingual classrooms. Of the 582 children on the campus, 51% are Hispanic, 41% African-American, and 8% other; (b) prekindergarten traditional campus B had 89% economically disadvantaged and 56% limited English proficient (LEP) students. Of the 592 children on the campus, 88% are Hispanic, 5% African-American, and 7% other. Fifty six percent of the children are categorized as limited English proficient (LEP) but only 30% are served in bilingual classrooms; (c) prekindergarten traditional campus C had 90.2% economically disadvantaged and 43.9% limited English proficient (LEP) students. Of the 510 children on the campus, 62.5% are Hispanic, 26% African-

American, and 14.4% other. Forty three percent of the children are categorized as limited English proficient (LEP) but only 20% are served in bilingual classrooms (Texas Education Agency, 2001). Students were not served in the bilingual classroom due to bilingual teacher shortage.

The prekindergarten traditional schools B and C, opened in the fall of 1997, were a result of school district's successful passage of a 20 million dollar bond election to support the building of four early childhood centers. The prekindergarten traditional schools were also 40,000 square foot urban campuses that housed 18 classrooms, a multi-purpose room, library, teacher workroom, lounge, nurse's station, parent workroom, diagnostician office, counseling room, speech therapy room, and an office area. Each classroom was equipped with its own lavatory, drinking fountain, and sink. Twelve classrooms are in open areas, while six are self-contained. A grass-covered playground surrounds the campus.

Instrumentation

The participants of our study were administered Reading section of the Aprenda (Spanish) and the Iowa Test of Basic Skills (ITBS; English). The ITBS and the Aprenda tests used in the study are administered to LEP students on an annual basis by the school district to measure student progress. The ITBS English test is administered to LEP students who have some English skills. If they do not have English skills, they are exempt from taking the ITBS test. The administrators were interviewed using a ten-item questionnaire that was developed by the researcher.

Aprenda

The Aprenda Spanish test is a written test that contains the following sections Word Reading, Reading Comprehension, Language, and Listening (Harcourt Brace, 1998).

Reliability and Validity of Aprenda Spanish Test

Aprenda was normed in the spring and fall of 1996 on approximately 56,000 students in a nationwide sample of Spanish speaking students. Test-retest reliability in pre-reading and reading portions of this assessment battery were in the 0.85 range for children in grades K-2. Criterion validity was assessed by comparing performance on this version of Aprenda with the previous version of Aprenda. Kuder-Richardson Formula #20 Reliability Coefficient of .94 for second grade students for Total Reading (Harcourt Brace, 1998).

Iowa Tests of Basic Skills (ITBS)

This instrument was selected by the school district for second grade students as a pretest and as a posttest. This was used to measure English reading achievement gains for bilingual students. Bilingual second grade students who had English reading skills were administered the test. If they did not have English reading skills, they were exempt from taking the ITBS test.

Reliability and Validity of Iowa Tests of Basic Skills (ITBS)

This assessment was normed using a national sample at beginning and end of the school year in 1995. Utilizing Kuder-Richardson Formula 20 (KR-20) procedures, the reliability coefficient of .943 for Total Reading for second grade students in the spring (Riverside, 1995). This formula provides a reliability estimate equaling the average of all

split-half coefficients available on all possible divisions of the test into halves (Gall, Borg, & Gall, 1996).

Although the ITBS had a high coefficient, the technical manuals do not discuss the appropriateness or inappropriateness of the tests for LEP students. Small percentages of LEP students were included in the ITBS standardization sample, ranging from a high of 1.5% in Grade 6 to a low of 0.3% in Grade 12. Students enrolled in bilingual or ESL programs ranged from 1.7% of the ITBS national standardization sample in Grade 3 to 0.5% in Grades 9, 10, and 12 (Zehler, Hopstock, Fleischma & Greniuk, 1994).

Design

Quantifiable variables used in the study were student achievement scores for second grade students as measured by the reading sections of the ITBS English test and the Aprenda Spanish test and the participation in either a prekindergarten Montessori bilngual program or a traditional bilingual prekindergarten program.

Procedures

Data Collection and Data Analysis

For the purposes of our study, data were collected from among four prekindergarten schools, eight elementary campuses, and 450 students. According to Gall, Borg, and Gall (1996), if the difference between the two groups of students being compared is anticipated to be large, with a more rigorous statistical power level of .7 at .05 level of significance, only 40 participants would be needed for the research sample, or if it is anticipated to be medium, 100 participants would be needed for the research sample. We randomly selected 100 participants.

Data Collection. For the purposes of this question, students had been computer coded as being enrolled in prekindergarten Montessori bilingual program or in a prekindergarten traditional bilingual program. Principals and teachers were notified that permission had been granted to conduct this study and that all data collected would be reported anonymously. The Aprenda Spanish reading achievement scores and the ITBS reading achievement scores for all eligible second grade students in the Fall of 2001 were collected; 450 total students were found to have been eligible as determined by the requirements of our study and to have the total reading battery score in both languages. Achievement tests were administered by certified teachers in accordance with the schedule of the school districts' testing coordinator.

Data Analysis. Data were analyzed using SPSS10. SPSS (Statistical Package for the Social Sciences), a data management and analysis product produced by SPSS, Inc. in Chicago, Illinois. Among its features are modules for statistical data analysis, including descriptive statistics such as plots, frequencies, charts, and lists, as well as sophisticated inferential and multivariate statistical procedures like analysis of variance (ANOVA), factor analysis, cluster analysis, and categorical data analysis (SPSS, 2001).

An independent *t*-test was conducted to determine if there were statistically significant differences between the two groups of students. For the Aprenda Spanish test, NCE scores were used in the calculation of the *t*-test because it is the most useful in manipulating test data for comparison of scores across tests across subjects.

An independent *t*-test was conducted to determine if there were statistically significant differences between the two groups of students on the ITBS reading subtest

(fall testing). Standard scores were used in the calculation of the *t*-test because NCEs were not reported to the district.

The American Psychological Association (2001) recommends reporting the effect size of a research study. The effect size was calculated as an indication of the practical or meaningful significance(Lunenburg, 2001).

Results

Descriptive statistics were used to describe the basic features of the data in this study. Table I depicts the results of the independent *t*-test for the Aprenda and ITBS for children who had participated in a prekindergarten Montessori bilingual program and who had continued through second grade in a transitional bilingual program and the children who had participated in a traditional bilingual prekindergarten program and who had continued through second grade in an English as a Second Language program on the English reading subtest of the ITBS achievement test.

Table I.

Descriptive Analysis of the Aprenda and ITBS Reading Test Results for Fall, 2001

Program Type	N		M		SD	
	Aprenda	ITBS	Aprenda	ITBS	Aprenda	ITBS
Montessori Transitional Bilingual	50	50	67.8640	146.6000	11.3468	10.4080
Traditional Transitional Bilingual	50	50	62.8460	137.4200	13.6086	6.9842

Spanish Reading Results

A sample of 100 second grade LEP students was drawn in a stratified random manner from among 450 second grade LEP students' eight elementary campuses that serve the most LEP students in the district. The 450 students from the eight elementary campuses first were stratified as to their participation in a prekindergarten Montessori bilingual program or in a traditional bilingual prekindergarten program who had taken the Aprenda Spanish reading subtest in second grade; this stratification resulted in 200 students total. According to Gall, Borg, and Gall (1996), if the difference between the two groups of students being compared is anticipated to be medium, with a more rigorous statistical power level of .7 at .05 level of significance, 100 participants would be needed for the research sample. Therefore, a further reduction in the sample group was conducted. Fifty participants were assigned randomly from the group that had

participated in a prekindergarten Montessori bilingual program, and 50 participants were assigned randomly from the group that had participated in a traditional bilingual prekindergarten program. Each of these groups students had continued through second grade in a transitional bilingual program.

An independent *t*-test was conducted to determine if there were statistically significant differences between the two groups of students. NCE scores were used in the calculation of the *t*-test because it is the most useful in manipulating test data for comparison of scores across tests across subjects. It is a normalized standard score with a mean of 50 and a standard deviation of 21.06 for the Aprenda test. Table II depicts the results of the independent *t*-test.

Table II.

Independent t-test for the Aprenda Spanish Reading Subtest

Program	n	M	SD	SE	95% Confidence Interval		*t*	df	p
					Lower	Upper			
Montessori Transitional Bilingual	50	67.8640	11.3468	1.6047	4.538E-.02	9.9906	2.003	98	.048
Traditional Transitional Bilingual	50	62.8460	13.6086	1.9245					

$p \leq .05$

The results of the independent *t*-test indicated that the children who had participated in a prekindergarten Montessori bilingual program significantly outscored the children who

had participated in a traditional bilingual prekindergarten program on the Spanish reading subtest of the Aprenda achievement test. The confidence intervals as reported on the difference was at 95% confidence interval [CI] = .0024538 - 9.9906. There was less variance among the Montessori group's Spanish reading scores (SD = 11.3468) as opposed to the Traditional group's scores (SD = 13.6086). Additionally, the Cohen's *d* was calculated with a .4005 which is considered a low medium effect size (http://www.uccs.edu/~lbecker/psy590/es.htm#III.%20Effect%20size%20measures%20for%20two%20dependent, 2002). Unlike the *t*-test, the effect size calculation is independent of sample size. The effect size of .40 means that the score of the average person in the Montessori group exceeds the scores of 39% of the Traditional group.

Discussion of Spanish Reading Aprenda Results. The results of the Spanish Reading Aprenda indicate that children who participated in a prekindergarten Montessori bilingual program scored significantly higher than children who participated in a traditional bilingual prekindergarten program. It is the expectation of the school district in which this study took place that schools implement the vertically aligned benchmark targets for grades PK-12 that was developed by the school district. The prekindergarten Montessori bilingual program sets higher expectations well above the district benchmarks. For example, one of the benchmark targets states that children in prekindergarten will master ten initial letter sounds by the end of the school year. The prekindergarten Montessori bilingual program sets the benchmark expectations for their campus at 26 initial letter sounds, which is above the districts' expectations. The traditional bilingual prekindergarten program meets the districts' benchmark target. The principal, the teachers, and support staff have a clear understanding of the higher

expectations for Spanish reading. Ladson-Billings (1994) maintained that teachers of successful learners of color believe that students are capable of excellence, and they assume responsibility for ensuring that their students achieve that excellence. Scheurich (1998) stated that just succeeding with the children in one's classroom is not sufficient; each teacher must work together with administrators and other teachers to ensure success for all children.

Additionally, the principal at the prekindergarten Montessori bilingual program makes every effort to recruit highly qualified bilingual early childhood teachers and provides the additional training to ensure student achievement success, while the traditional prekindergarten principals state, "they can't find the teachers so they place the children in English as a Second Language." At the end of the school year, the ESL prekindergarten students are re-tested and placed in a bilingual kindergarten program at the elementary campuses. Ongoing and sustained staff development opportunities are an integral part of the school year. Teachers are provided with release time to attend follow-up or enrichment Montessori training during school hours. The traditional bilingual prekindergarten programs do not have curriculum guides to use to implement the benchmark targets. There training does not specially focus on phonemic awareness but rather a whole language approach. For example, the prekindergarten Montessori bilingual program focuses specifically on teaching letter sounds through hands-on approach by using objects and sandpaper letters. The traditional bilingual prekindergarten program teaches the letter name and utilizes coloring dittos to reinforce the letter name. Snow, Burns and Griffin (1998) in *Preventing Reading Difficulties in Young Children*, recommended that kindergarten reading instruction encompass both the mechanics of

reading (e.g., practice with the sound structure of words, recognition of letters, and purposes for reading) and the development of text comprehension (e.g., talk about books, reading strategies, and the development of conceptual knowledge).

The elementary schools who were supportive of additive bilingualism, as evidenced by their move away from early-exit transitional bilingual education programs, tended to have higher reading test scores. Escamilla (1998) stated that the larger school context can greatly impact what goes on in bilingual classrooms within the school.

In summary, the sociolinguistic environment of the school may have increased students' motivation to read in Spanish. Children living in these linguistic environments are afforded richer access to the Spanish language, which broadens their oral language development, a critical factor in learning to read in any language. It may be that the children are retaining their Spanish language long enough to facilitate their Spanish reading development. According to Durgunoglu and Verhoeven (1998), Fradd and Boswell (1996), and Solé (1980), if the use of the minority language offers opportunities for economic gain, the language will also enjoy a higher status.

The collective awareness of teachers and administrators about their reading program in Spanish brings about a sense of accountability for the success of all children. According to Goldenberg and Sullivan (1994), the principal's role is crucial and is fundamental to provide support and exert pressure. It is the school's principal who created the expectation and needed opportunities for teachers to plan together whether they were teaching children to read in Spanish.

Implications for Practice

The Montessori curriculum is universal. The instructional concepts associated with the Montessori material are the same. The Montessori program is implemented in the child's primary language. Important tools for learning reading and arithmetic are developed early in a natural way and, thus, make their enormous contribution to children's ability to explore and learn. Montessori education is a child-centered approach. It does represent an expensive option in which costs for specialized teacher training and specific Montessori materials can seem to be out of ones reach. Further research is needed the area of bilingual education and Montessori. The literature review provided virtually no studies in which bilingual low socioeconomic students participated in a bilingual Montessori program. Sound instructional reading programs that support the student's primary language are essential in the transferring of skills from the first language to the second language and we conclude that the Montessori method is successful in the transference of such skills.

English Reading Results

A sample of 100 second grade LEP students was drawn in a stratified random manner from among 450 second grade students from eight elementary campuses that serve the most LEP students in the district. The 450 second grade students were first stratified as to their participation in a prekindergarten Montessori bilingual program or in a traditional bilingual prekindergarten program that had taken the ITBS reading subtest in second grade; this stratification resulted in 200 students total. According to Gall, Borg, and Gall (1996), if the difference between the two groups of students being compared is anticipated to be medium, the with a more rigorous statistical power level of .7 at .05 level of significance, 100 participants would be needed for the research sample.

Therefore, a further reduction in the sample group was conducted. Fifty participants were assigned randomly from the group that had participated in a prekindergarten Montessori bilingual program, and 50 participants were assigned randomly from the group that had participated in a traditional bilingual prekindergarten program. The students who had participated in the prekindergarten Montessori bilingual program continued in a transitional bilingual program through second grade; however, it was determined through review of cumulative records that the students who participated in the traditional bilingual prekindergarten program continued in an English as a Second Language program. This is significant in light of the findings.

An independent *t*-test was conducted to determine if there were statistically significant differences between the two groups of students on the ITBS reading subtest (fall testing). Standard scores were used in the calculation of the *t*-test because NCEs were not reported to the district. Table III gives the approximate standard scores corresponding to the 50th percentile (national median) in reading for each grade in the spring of the school year. The exact percentile rank corresponding to a given standard score may vary slightly from one subject to another.

Table III.

Standard Scores Corresponding to the 50th Percentile (National Median) in ITBS Reading (Spring)

Grade	Standard Score Corresponding Approximately to the Spring National 50th Percentile in Reading
1	150
2	168
3	185
4	200
5	214
6	227
7	239
8	250

Source: New ITBS (Form CPS 02) Questions & Answers. (2002).

Retrieved May 25, 2002 from http://intranet.cps.k12.il.us/Assessments/ITBS___TAP/FAQ_4-18-02.pdf.

Table IV depicts the results of the independent *t*-test for the ITBS reading subtest for two groups of second grade LEP students: (a) students who participated in a prekindergarten Montessori bilingual program and continued in a transitional bilingual program through second grade and (b) students who participated in a traditional bilingual prekindergarten program and continued in an English as a Second language program through second grade.

Table IV.

Independent t-test for the ITBS English Reading Subtest, Fall, 2001 Administration

Program	n	M	SD	SE	95% Confidence Interval		*t*	df	p
					Lower	Upper			
Montessori Transitional Bilingual	50	146.6000	10.4080	1.4719	5.6623	12.6877	5.179	98	.000
Traditional Transitional Bilingual	50	137.4200	6.9842	.9877					

$p \leq .05$

The results of the independent *t*-test indicated that the children who had participated in a prekindergarten Montessori bilingual program and who had continued through second grade in a transitional bilingual program significantly outscored the children who had participated in a traditional bilingual prekindergarten program and who had continued through second grade in an English as a Second Language program on the English reading subtest of the ITBS achievement test. The confidence intervals as reported on the difference was at 95% confidence interval [CI] = 5.6623 – 12.6977. There was more variance among the Montessori group's English reading scores (SD = 10.4080) as opposed to the Traditional group's scores (SD = 6.9842). Additionally, the Cohen's *d* was calculated with a 1.035, which is considered a large effect size (http://www.uccs.edu/~lbecker/psy590/es.htm#III.%20Effect%20size%20measures%20for%20two%20dependent, 2002). Unlike the *t*-test, the effect size calculation is

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independent of sample size. The effect size of 1.035 means that the score of the average person in the Montessori group exceeds the scores of 99% of the traditional group.

Discussion of Reading ITBS Results. The results of the ITBS reading test indicate that students who participated in a prekindergarten Montessori bilingual program and who continued in a transitional bilingual program scored significantly higher in English reading than students who participated traditional bilingual prekindergarten program and then continued their education in ESL. Greene (1998) found in a meta-analysis scholarly research that children with limited English proficiency who are taught using at least some of their native language perform significantly better on English standardized tests than similar children who are taught only in English. An unbiased reading of the scholarly research suggests that bilingual education helps children who are learning English. After two years in which one student was in a bilingual program and the other student was in an English-only program, the bilingual student would be performing about 1/5 of a standard deviation better than the English-only student on the ITBS English reading test (Greene, 1998). Former Secretary of Education Richard W. Riley stated: "Bilingual education ensures that students who are not native English speakers get the necessary grounding in core academic subjects while making the transition to all-English classrooms" (Supik, 1997). Literacy in a child's native language establishes a knowledge, concept, and skills base that transfers from native language reading to reading in a second language (Collier & Thomas, 1992;Cummins, 1989; Escamilla, 1987; Modiano, 1968; Rodriguez, 1988). Moreover, it has been established that, for Spanish-speaking children, there is a high and positive correlation between learning to read in Spanish and subsequent reading achievement in English (Collier & Thomas, 1992; Greene, 1998

Krashen & Biber, 1987; Lesher-Madrid & García, 1985; Ramírez, Yuen, & Ramey, 1991). Escamilla (1998) stated that there is strong theoretical and empirical evidence to suggest that teaching Spanish-speaking children in the U.S. to read and write first in Spanish constitutes both sound policy and "best practice."

Implications for Practice. The results indicate that students in transitional bilingual programs that emphasize the student's primary language tended to score higher in English reading than students who were in all English programs. The following must be present in prekindergarten Montessori bilingual programs to be successful in public schools: (a) strong teacher training by quality training programs, (b) parent support, (c) administrative support and understanding of Montessori, (d) ongoing staff development and research and study by the Montessori staff of both what Montessori wrote and current research findings, (e) Montessori programs that are integrated with district benchmarks and assessment, and (f) private and public programs that cross the boundaries and offer their strengths to each other by co-training and other initiatives that can strengthen the bonds.

The development and implementation of the Montessori program is a process. The Montessori curriculum is a total curriculum approach that is integrated and sequential. Full benefits can be achieved only if the dynamic of the total program is understood by a Montessori trained teaching staff that shares a common educational philosophy. Teacher training needs to be a top priority. Montessori training is intensive and imparts an attitude as well as information. The training includes Montessori child psychology, educational theory, material demonstrations, supervised practice with

Montessori materials, observation of Montessori classrooms, supervised practiced teaching, and extensive written and oral exams. Multi-aged clusters enhance the Montessori dynamic by reducing competition, maximizing curriculum options available to any one child, providing a family atmosphere that plays a vital role in socialization, and permitting older children to model advanced work for younger children.

The Montessori material is costly. Schools who are considering implementing the program could seek additional funding. In order to provide adequate support, trained administrators could assist with educating parents about the Montessori philosophy. It is also important that the district be made aware of correlations between Montessori and district curriculum expectations. Teachers' common understanding of their lesson planning and curriculum scope and sequence is essential to the success of the program. Expected levels of student achievement should be developed school-wide. Additionally, child's progress should be reported accurately within a Montessori environment. The district's traditional report card needs to be supplemented with a card that reflects the Montessori skills. Involving the parents in all aspects of the school can increase parent support. Research confirms that academic achievement is directly impacted by parental involvement. Although Montessori children tend to be academically successful, correlation of standardized tests to the Montessori curriculum is recommended. This gives the children an opportunity to get exposure to the test.

Conclusions

Our study addressed the long-term academic impact of the prekindergarten Montessori bilingual program on primary grade students' (second grade) academic achievement as compared to a traditional bilingual prekindergarten program. According

to Rosanova (2000), Montessori bilingual education was virtually unexplored by the American Montessori educational community. Although bilingual Montessori programs are almost nonexistent, there is sufficient evidence in our study that warrants leaders of early childhood programs to give serious consideration to the Montessori curriculum due to the positive effects it has had on LEP students. The Montessori curriculum is a total curriculum that is integrated and sequential. The teachers in this program are well trained by the National Center for Montessori Education. In order to maintain the consistency in the program and to provide teachers with effective role models, on-going and sustain curriculum support is scheduled throughout the school year. Additionally, the Montessori program provides multi-age classrooms, which allows the curriculum to build as the children move through the program one year at a time. The multi-age clusters allow for older children to model work for the younger child. The material in the Montessori classroom is unique in that it suffices for the multi-age classroom and that component is cost effective. Although the initial Montessori program set up is costly, maintaining the program is not more than that of a traditional classroom.

The program that was the focus of our study was a transitional Montessori bilingual model. To date, the literature has not provided sufficient data related to the implementation or impact of transitional Montessori bilingual education in a prekindergarten public school. Our study's results have yielded data important for administrators and teachers as they attempt to reform prekindergarten bilingual programs.

Two groups of second grade students from a large, urban public school district in Houston, Texas, were evaluated for academic achievement in reading based on their participation in a prekindergarten Montessori bilingual program or a traditional bilingual

prekindergarten program. Academic achievement in Spanish was assessed using the Aprenda in terms of National Curve Equivalence in Total Reading scores. Scores were examined by random in reading, one each from the Montessori and Traditional groups.

The results of the independent *t*-test indicated that the children who had participated in a prekindergarten Montessori bilingual program significantly outscored the children who had participated in a traditional bilingual prekindergarten program on the Spanish reading subtest of the Aprenda achievement test. The results indicated that students who are provided with a solid foundation in their native language will transition those skills to English. According to Fillmore (1991), severe native language loss occurs when bilingual preschoolers are placed in all-English setting and when bilingual elementary students leave bilingual programs too soon.

On the English reading subtest of the ITBS achievement test, the results of the independent *t*-test indicated that the children who had participated in a prekindergarten Montessori bilingual program and who had continued through second grade in a transitional bilingual program significantly outscored the children who had participated in a traditional bilingual prekindergarten program and who had continued through second grade in an English as a second language program. The results suggest that school districts should closely at program placement for limited English proficient students. Additionally, every effort should be made by school administrators to recruit and retain qualified bilingual teachers in order to ensure appropriate placement for the LEP student. To bring about improvement in reading and LEP students, it will be critical that schools provide the best professional development.

In summary, results indicate that the Montessori bilingual program is an effective alternative bilingual program and one that should provide leaders an option in reforming prekindergarten for low SES, LEP children. The results suggest that school districts need to look closely at bilingual Montessori programs for limited English proficient students. Additionally, we recommend that the district investigate third grade TAAS scores to further evaluate the impact of the Montessori program. To bring about improvement in reading and LEP students if Montessori is the selected program model, it will be critical that schools provide Montessori professional development that leads to Montessori certification.

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